



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 01-0305858

THE APPLICATION OF VIRTEX OPERATING COMPANY, INC. PURSUANT TO STATEWIDE RULE 9 AND STATEWIDE RULE 36 FOR A PERMIT TO INJECT FLUID CONTAINING HYDROGEN SULFIDE INTO A RESERVOIR NOT PRODUCTIVE OF OIL AND GAS, R K HARLAN AGI LEASE, WELL NO. 1, DOERING RANCH (GLEN ROSE H₂S DISPOSAL) FIELD, FRIO COUNTY, TEXAS

HEARD BY: Karl Caldwell – Technical Examiner
Jennifer Cook – Administrative Law Judge

HEARING DATE: September 18, 2017
RECORD CLOSED: September 21, 2017
CONFERENCE DATE: November 7, 2017

APPEARANCES: REPRESENTING:

APPLICANT: Virtex Operating Company, Inc.

Michael McElroy
John Miller

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Virtex Operating Company, Inc. (Virtex) requests authority pursuant to Statewide Rule 36 to inject fluids containing hydrogen sulfide (H₂S) into the proposed R K Harlan AGI Lease, Well No. 1. Virtex has filed Form W-14 *Application to Dispose of Oil and Gas Waste by Injection into a Formation Not Productive of Oil and Gas* pursuant to Statewide Rule 9. The Statewide Rule 9 application is unopposed and may be administratively processed pursuant to Statewide Rule 9(5)(F) pending approval of this Statewide Rule 36 application.

Statewide Rule 36(c)(10)(A) states that "injection of fluids containing hydrogen sulfide shall not be allowed under the conditions specified in this provision unless first approved by the Commission after public hearing:

- (i) where injection fluid is a gaseous mixture, or would be a gaseous mixture in the event of a release to the atmosphere, and where the 100 ppm radius of exposure is in excess of 50 feet and includes any part of a public area except a public road; or, if the 500 ppm radius of exposure is in excess of 50 feet and includes any part of a public road; or if the 100 ppm radius of exposure is 3,000 feet or greater;
- (ii) where the hydrogen sulfide content of the gas or gaseous mixture to be injected has been increased by a processing plant operation."

In this application, the 100 ppm radius of exposure (ROE) is estimated to be 2,762 feet, and the 500 ppm ROE to be 1,257 feet. Virtex intends to build an amine plant at the proposed disposal well site and dispose of the waste gas generated by the plant into the proposed R K Harlan AGI No. 1 well. This waste gas will contain H₂S and carbon dioxide (CO₂) and a public hearing is required pursuant to Statewide Rule 36(c)(10)(A). A hearing on the application was held on September 18, 2017. The Commission's Field Operations has reviewed and approved the Form H-9 (Certificate of Compliance Statewide Rule 36) and H₂S Contingency Plan and has determined that the proposed application complies with the applicable provisions of Statewide Rule 36 regarding materials and operation.

Virtex has filed Form W-14 *Application to Dispose of Oil and Gas Waste by Injection into a Formation Not Productive of Oil and Gas* pursuant to Statewide Rule 9. The Statewide Rule 9. In the Statewide Rule 9 application, Virtex has requested authority to inject up to 3,500 MCFD of fluids containing hydrogen sulfide, and 5,000 BWPD into its R K Harlan AGI Well No. 1. The waste gas will contain approximately 32% hydrogen sulfide and 67% carbon dioxide. Pending approval of this Statewide Rule 36 application, the Statewide Rule 9 application will be remanded to the Underground Injection Control (UIC) Section for administrative processing of the application pursuant to Statewide Rule 9 (5)(F) as the application is unopposed. The Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend Statewide Rule 36 authorization be granted.

DISCUSSION OF THE EVIDENCE

Virtex plans to construct an amine plant and drill the R K Harlan AGI Well No. 1, on a 5,514 acre lease approximately 13.3 miles northwest of Dilley, Texas. This facility will process produced sour gas from area wells, and the waste gas which contains CO₂ and H₂S will be disposed of into the proposed RK Harlan AGI Well No. 1. Notice of the application pursuant to Statewide Rule 9 and Statewide Rule 36 was provided to the surface owner, and to the Frio County Clerk. The Notice of Application pursuant to Statewide Rule 9 and 36 was published in the *Frio-Nueces Current*, a newspaper of general circulation in Frio and La Salle Counties on June 22, 2017. Virtex is the only operator within a half-mile radius of the proposed well location, and no other operators or entities are located within the 100 ppm or 500 ppm radius of exposure or 7100-foot plume radius. There are no residences within the 100 ppm ROE or 500 ppm ROE for the well.

County Road 4120 connects the location of the proposed facilities to FM 117, and County Road 4120 is therefore within both the 100 ppm and 500 ppm ROE's. However, public access to County Road 4120 is limited by a gate at the intersection to FM 117. The application pursuant to Statewide Rule 9 and Statewide Rule 36 is unopposed.

A reservoir simulation was performed for the proposed injection into the R K Harlan AGI Well No. 1 to predict the maximum probable extent of underground waste migration. The software used in the simulation consisted of *Builder*, *Results*, *Winprop*, and *GEM*. *Builder* and *Results* are the pre- and post- processing modules, respectively. *Winprop* is the PVT modeling module, and *GEM* is the compositional simulation module. The fluid being disposed of consists of approximately 32% hydrogen sulfide and 67% carbon dioxide. Based on the simulation, the maximum radial extent of the acid gas plume is estimated to be approximately 7,100 feet from the proposed well, after 40 years of injection at the maximum requested rates. A study of all 44 wellbores within this 7,100 foot plume radius shows the only well that penetrated the proposed disposal interval is the R K Harlan No. 2, operated by Virtex. This well was drilled to a total depth of 10,300 feet and is currently producing from the Doering Ranch (Georgetown) Field, with perforations from 6,372 feet to 6,397 feet. These perforations are isolated from the proposed disposal interval in the Glen Rose Formation by a cast iron bridge plug (CIBP) set at 6,630 feet, with 20 feet of cement on top of the CIBP.

The maximum escape rate of fluids containing H₂S is estimated to be 58 MMCFD, which uses the worst-case conditions of complete wellhead failure and direct gas discharge from the open casing. Virtex employed Arcadis to perform gas dispersion modeling based on the results of the 58 MMCFD maximum escape rate. Arcadis used a dispersion model called *CANARY* to determine the radius of exposure of H₂S. The *CANARY* model has been previously accepted by the Railroad Commission for radius of exposure ("ROE") calculations.¹ The calculated ROE for 100 ppm H₂S, due to the maximum catastrophic release at the proposed injection well, is 2,762 feet from the wellbore. For 500 ppm, the calculated ROE is 1,257 feet from the wellbore.

Form H-9 (Certificate of Compliance Statewide Rule 36) and a contingency plan have been prepared for the proposed disposal operations, based on the calculated ROE values. There are no residences within the 100 ppm ROE or 500 ppm ROE for the well. County Road 4120 connects the location of the proposed facilities to FM 117, and County Road 4120 is therefore within both the 100 ppm and 500 ppm ROE's. However, public access to County Road 4120 is limited by a gate at the intersection to FM 117. By memo dated September 15, 2017, the Commission's Field Operations has reviewed and approved the Form H-9 (Certificate of Compliance Statewide Rule 36) and H₂S Contingency Plan and has determined that the proposed application complies with the applicable provisions of Statewide Rule 36 regarding materials and operation.²

¹ See Oil and Gas Docket Nos. 01-0300843, 01-0271975 and 01-0249550

² Exhibit No. 28.

FINDINGS OF FACT

1. Virtex Operating Company, Inc. (Virtex) requests authority pursuant to Statewide Rule 36 to inject fluids containing hydrogen sulfide (H₂S) into the proposed R K Harlan AGI Lease, Well No. 1.
2. Virtex has filed Form W-14 *Application to Dispose of Oil and Gas Waste by Injection into a Formation Not Productive of Oil and Gas* pursuant to Statewide Rule 9.
3. The Statewide Rule 9 application is unprotested and may be administratively processed pursuant to Statewide Rule 9(5)(F).
4. Statewide Rule 36 requires a public hearing to be held for the injection of fluids containing hydrogen sulfide where:
 - a. injection fluid is a gaseous mixture, or would be a gaseous mixture in the event of a release to the atmosphere, and where the 100 ppm radius of exposure is in excess of 50 feet and includes any part of a public area except a public road; or, if the 500 ppm radius of exposure is in excess of 50 feet and includes any part of a public road; or if the 100 ppm radius of exposure is 3,000 feet or greater; or
 - b. the hydrogen sulfide content of the gas or gaseous mixture to be injected has been increased by a processing plant operation.
5. Virtex intends to build an amine plant at the proposed disposal well site and dispose of the waste gas generated by the plant into the proposed R K Harlan AGI No. 1 well.
 - a. This waste gas will contain H₂S and carbon dioxide (CO₂).
 - b. a public hearing is required pursuant to Statewide Rule 36(c)(10)(A).
 - c. A hearing on the application was held on September 18, 2017.
 - d. The application is unprotested.
6. Virtex intends to construct an amine plant and drill the R K Harlan AGI Well No. 1, on a 5,514 acre lease approximately 13.3 miles northwest of Dilley, Texas. This facility will process produced sour gas from area wells, and the waste gas which contains CO₂ and H₂S will be disposed of into the proposed RK Harlan AGI Well No. 1.

7. The maximum escape rate of fluids containing H₂S is estimated to be 58 MMCFD, which assumes worst case conditions of complete wellhead failure and direct gas discharge from the open casing.
8. Virtex employed Arcadis to perform gas dispersion modeling based on the results of the 58 MMCFD maximum escape rate.
 - a. Arcadis used a dispersion model called *CANARY* to determine the radius of exposure of H₂S.
 - b. This model has been previously accepted by the Railroad Commission for radius of exposure ("ROE") calculations, including Oil and Gas Docket Nos. 01-0300843, 01-0271975 and 01-0249550.
 - c. The calculated ROE for 100 ppm H₂S, due to the maximum catastrophic release at the proposed injection well, is 2,762 feet from the wellbore. For 500 ppm, the calculated ROE is 1,257 feet from the wellbore.
9. Notice of the application pursuant to Statewide Rule 9 and Statewide Rule 36 was provided to surface owner, and to the Frio County Clerk.
10. The Notice of Application pursuant to Statewide Rules 36 and 9 was published in the *Frio-Nueces Current*, a newspaper of general circulation in Frio and La Salle Counties on June 22, 2017.
11. Virtex is the only operator within a half-mile radius of the proposed well location, and no other operators or entities are located within the 100 ppm or 500 ppm radius of exposure or 7100-foot plume radius.
12. There are no residences within the 100 ppm ROE or 500 ppm ROE for the well. County Road 4120 connects the location of the proposed facilities to FM 117, and County Road 4120 is therefore within both the 100 ppm and 500 ppm ROE's, however, public access to County Road 4120 is limited by a gate at the intersection to FM 117.
13. The Commission's Field Operations has reviewed and approved the Form H-9 (Certificate of Compliance Statewide Rule 36) and H₂S Contingency Plan and has determined that the proposed application complies with the applicable provisions of Statewide Rule 36 regarding materials and operation.
14. Virtex agreed, that, pursuant to the provisions of Texas Government Code § 2001.144(a)(4)(A), this Final Order shall be effective on the date a Master Order relating to this Final Order is signed.

CONCLUSIONS OF LAW

1. Proper notice was issued as required by all applicable statutes and regulatory codes.
2. All things have occurred and been accomplished to give the Commission jurisdiction in this matter.
3. Virtex has complied with the requirements of Statewide Rule 36(c)(10)(A)(ii).
4. Pursuant to § 2001.144(a)(4)(A), of the Texas Government Code, and the agreement of the applicant, this Final Order is effective when a Master Order relating to this Final Order is signed on November 7, 2017.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend that the Commission grant Statewide Rule 36 authorization for the R K Harlan AGI Lease, Well No. 1, Frio County, Texas and Virtex Operating Company's application for a permit pursuant to Statewide Rule 9 for the above-referenced well be remanded for administrative consideration.

Respectfully submitted,



Karl Caldwell
Technical Examiner



Jennifer Cook
Administrative Law Judge